Common long bone fractures in small animal practice — Part 1

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The small animal practitioner can expect to see many long bone fractures over the course of a career. For those who are equipped to manage these surgically, the challenge is to select the appropriate fixation hardware and surgical technique. For many who may be prepared to tackle some intramedullary pin and wire applications or feel comfortable with external coaptation, the trick is to identify which cases will lend themselves to these techniques and which need to be referred. For those who refer most or all such cases, an understanding of what fractures are commonly seen, how they can be managed, and what prognosis goes along with them can be helpful in counseling clients.

An analysis of patient records from 282 long bone fractures managed surgically in our practice from September 1983 to December 2002 yielded some valuable information on the location and types of fractures seen most often.

The femur is, by far, the bone that is fractured most often in the dog and cat, comprising almost half of all long bone fractures in some surveys (1,2). Forty-five percent (128/282) of our long bone fractures were femoral fractures, 26% (74/282) were tibial fractures. It is interesting to speculate why almost 3 of every 4 long bone fractures in small animals occur in the hind limb. It may be that these represent only those patients that survived the traumatic episode, so as to be treated surgically. It is likely that trauma significant enough to fracture bones in the cranial half of the animal would more frequently cause lethal trauma to the head or chest. Similar trauma to the caudal half of the animal would be less likely to produce life-threatening injury. It may also be that animals see impending trauma coming (automobiles) and, in their effort to flee, they expose their hindquarters to the major force of the impact.

Fractures of the radius, ulna, or both were considered together since, concurrent fractures of both bones are seen in the vast majority of cases. These fractures accounted for 16% (46/282) of our cases. The humerus is the long bone that is fractured least often by all accounts (2) and was involved in 13% (36/282) of our cases.

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Figure 1. Saltar-Harris Type IV fracture of the lateral humeral condyle in a young puppy.

Parts 1 and 2 of this topic review the "top 5" categories of long bone fractures recorded in our survey. They are presented in reverse order of frequency of occurrence; nearly 80% of the long bone fractures fell into 1 of the 5 categories.

5. Distal humeral fractures

While humeral fractures were relatively uncommon overall, those that did occur (36/282) were predominantly in the condyles or adjacent metaphyseal area. Twenty-two of 36 humeral fractures were located here; 14 of the 22 involved one condyle, while 6 were Y or T fractures involving both condyles.

Humeral condylar fractures are most often seen in puppies 4 to 6 mo old. The vast majority involve the lateral condyle, because the lateral condyle is situated somewhat eccentrically, lateral to the force vector directed proximally through the humerus in the standing animal. When the front limbs are subjected to a major impact, such as jumping or falling, the lateral humeral condyle is literally sheared off by the head of the radius as it translates the compressive force to the humerus. In puppies of this age, it represents a Saltar-Harris Type IV fracture across the growth plate (Figure 1). Thirteen of 14 of our single condylar fractures involved the lateral condyle.

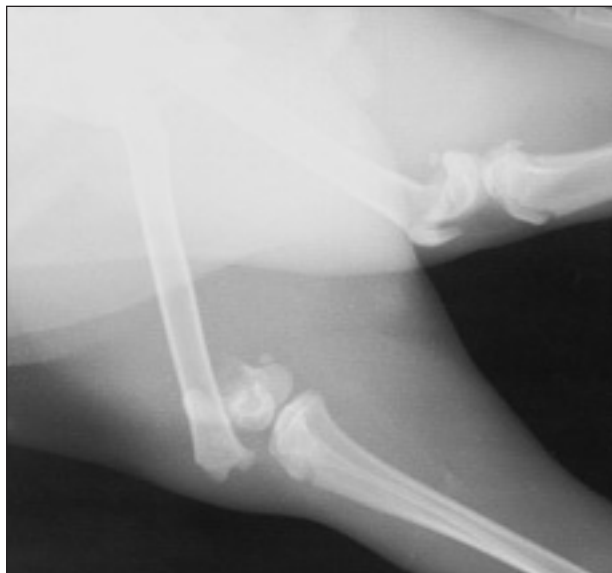While this fracture can be seen in any breed, it is most common in spaniels. Indeed, in spaniels, the

Figure 2. Saltar-Harris Type I fracture of the distal femur in a cat.

fracture is also seen in adult dogs and the force required to produce the injury may be relatively minimal (pivoting while running). This is thought to be due to incomplete ossification of the lateral humeral condyle, related to decreased vascular density within the condyles in spaniels, as compared with other breeds (3).

Successful repair of condylar fractures, in general, and lateral condylar fractures, specifically, requires anatomic reduction in order to preserve elbow joint function. This is usually accomplished with a transcondylar lag screw and, in addition, a 2nd screw or intramedullary pin placed from the distal aspect of the condyle into the humeral diaphysis in order to prevent rotation. Availability of the appropriate-sized screws and a power drill, plus confidence in the use of such equipment, is a prerequisite to tackling this fracture successfully. Screw size must be considered in presurgical planning: giant breeds will require a screw 3.5 mm in diameter and up to 50 mm long, while toy breeds will require screws 2.0 mm or even 1.5 mm in diameter. There are reports of successful management of these fractures in toy breeds with the use of various types and applications of Kirschner wires (4,5). The author has found that Kirschner wires do not provide the compression or stability of a lag screw and that wire migration during the healing period is common. Final results, however, are generally satisfactory. In some cases of condylar fracture in toy breed puppies, one may have little other option, since even a 1.5 mm diameter screw seems imposing in a patient that may weigh little more than a kilogram!

While the prognosis for any fracture involving a joint, especially one that also disrupts a growth plate, must be considered guarded, there is recent evidence to suggest that fractures of the lateral humeral condyle may have a better prognosis than originally thought. It appears that growth is not decreased, even if compression screws cross the growth plate (6).

4. Distal femoral fractures

Thirteen per cent (36/282) of all our long bone fractures and 28% of femoral fractures occurred in the distal metaphyseal-epiphyseal region of the femur. The majority of these were Saltar-Harris Type I or II fractures of the epiphysis in immature animals (Figure 2). This fracture is especially common in the cat. Comminution was found to occur in only 11%. Management of these fractures usually involves the use of Kirschner wires or intramedullary pins, as described previously (7). The prognosis for these fractures is good to excellent.

References

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